Team I

Team I

Team I
A
New Design Paradigm

by
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1. In a Nutshell

2. Areas of Expertise

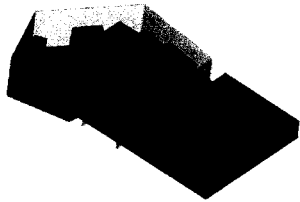3. Approach

4. Conclusions & Summary

Approach

**Discovery Phase 1
Gulliver**

IIP/OSIRIS
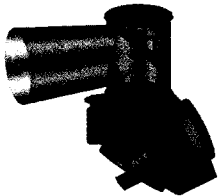
- *Concurrent Design Environment*

- *Total Systems Approach, Multi-Disciplinary Team*

- *Standing Design Team*

- *From Concept to Engineering Drawings*

- ***Interconnected, High-End*** *Optical, Microwave, Mechanical/CAD Thermal, Structural, Dynamics, Simulation, Orbital, Electronics Analysis and Design Tools, such as Code V, ZeMax, Mechanical Desktop, NASTRAN, Thermal Desktop, Adams, MODTool, and Working Model*

DS (ST)-4/CIRCLE

- *Applications Utilize a **Common** CAD Developed **Geometry***

- *Open Environment, import/export of STEP, NASTRAN files, etc., from/to JPL, other NASA centers, and Industry*

**Search Camera for the
CNES Orbiter**

**Loihi Deep Ocean,
Volcanic
Vent Probe**

- *Technology Insertion Through Cooperation with MDL/TAP*
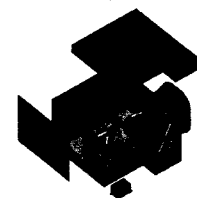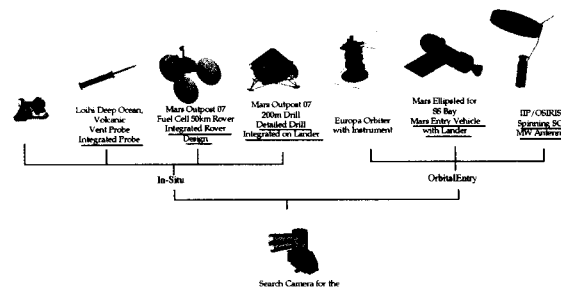
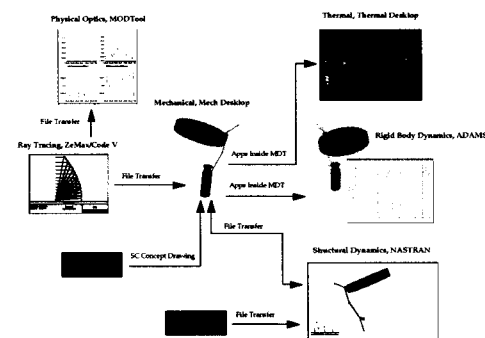- *Analysis and Design Time Cut from Months to Weeks*
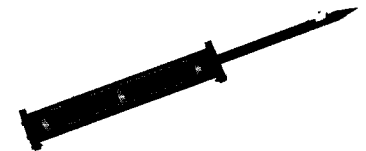
The Two Elements
Function and Approach

1. Expertise

2. Approach (Design Paradigm)

Support; Expertise

Team I
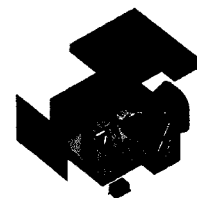
- *Expertise*
  - *Synthesis, Analysis, Simulation, and Design Support*
  - *Orbital and In-situ Payloads*
  - *Instruments to Fully Integrated Probes/Spacecraft*
    - *Optical, Microwave, Mass Spectrometer Instruments*
    - *Surface/Subsurface Pronbes. Rovers, Atmospheric Entry Vehicles, Dedicated SC.*

DS (ST)-4/CIRCLE

Loihi Deep Ocean,
Volcanic
Vent Probe
Integrated Probe

Mars Outpost 07
Fuel Cell 50km Rover
Integrated Rover
Design

Mars Outpost 07
200m Drill
Detailed Drill
Integrated on Lander

Venus Probe
on Ariane VI PB
Integrated SC and
Probe Design

Europa Orbiter
with Instrument
Instrument Design
and Integration

IIP/OSIRIS
Spinning SC
MW Antenna

In-Situ

OrbitalEntry

Search Camera for the
CNES Orbiter

Overall Process

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┌──────────────┐
│ Team I sends │
│    to the    │
│  Customer a  │      ┌──────────────┐
│   List of    │      │  Customer,   │     ┌──────────────┐
│  Suggested   │      │ and Team I   │     │   Team I     │    ┌──────────────┐
│    Input     │      │   meet to    │     │  Members     │    │  Concurrent  │    ┌──────────────┐    ┌──────────────┐    ┌──────────────┐
│  Parameters  │ ───▶ │   Discuss    │ ──▶ │  Prepare     │ ─▶ │   Team I     │ ─▶ │   Off Line   │ ─▶ │  Concurrent  │ ─▶ │ Final Report │
│ Required by  │      │  Required    │     │ Session(s).  │    │ session with │    │  Design and  │    │   Team I     │    │              │
│  the team    │      │  Input, and  │     │  CAD, and    │    │  Customer    │    │  Analysis    │    │   Session    │    │   Day  26    │
│ prior to the │      │   plan the   │     │ Optics Prep  │    │  Present     │    │    Work      │    │    with      │    │              │
│  Concurrent  │      │   Team I     │     │  Important   │    │  Day  14     │    │              │    │  Customer    │    └──────────────┘
│   Sessions   │      │  session(s)  │     └──────────────┘    └──────────────┘    └──────────────┘    │  Present     │
│   Day  0     │      │   Day  7     │                                                                  │  Day  24     │
└──────────────┘      └──────────────┘                                                                  └──────────────┘
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Stations

Team I

Projection Screen

System Station

Structural Station

Ph.B CAD Station

Speaker Phone

Projector Cont. Panel

Therm/CAD Station

Mech/CAD Station

Optics Station

Radiometry Station

CAD/3D Vis Station

Orb./El. Station

Approach (Design Paradigm):
Integrated, High-End Analysis and Design

Physical Optics, MODTool

Thermal, Thermal Desktop

File Transfer

Ray Tracing, ZeMax/Code V

Mechanical, Mech Desktop

File Transfer

Apps Inside MDT

Rigid Body Dynamics, ADAMS

Apps Inside MDT

File Transfer

SC Concept Drawing

Structural Dynamics, NASTRAN

File Transfer
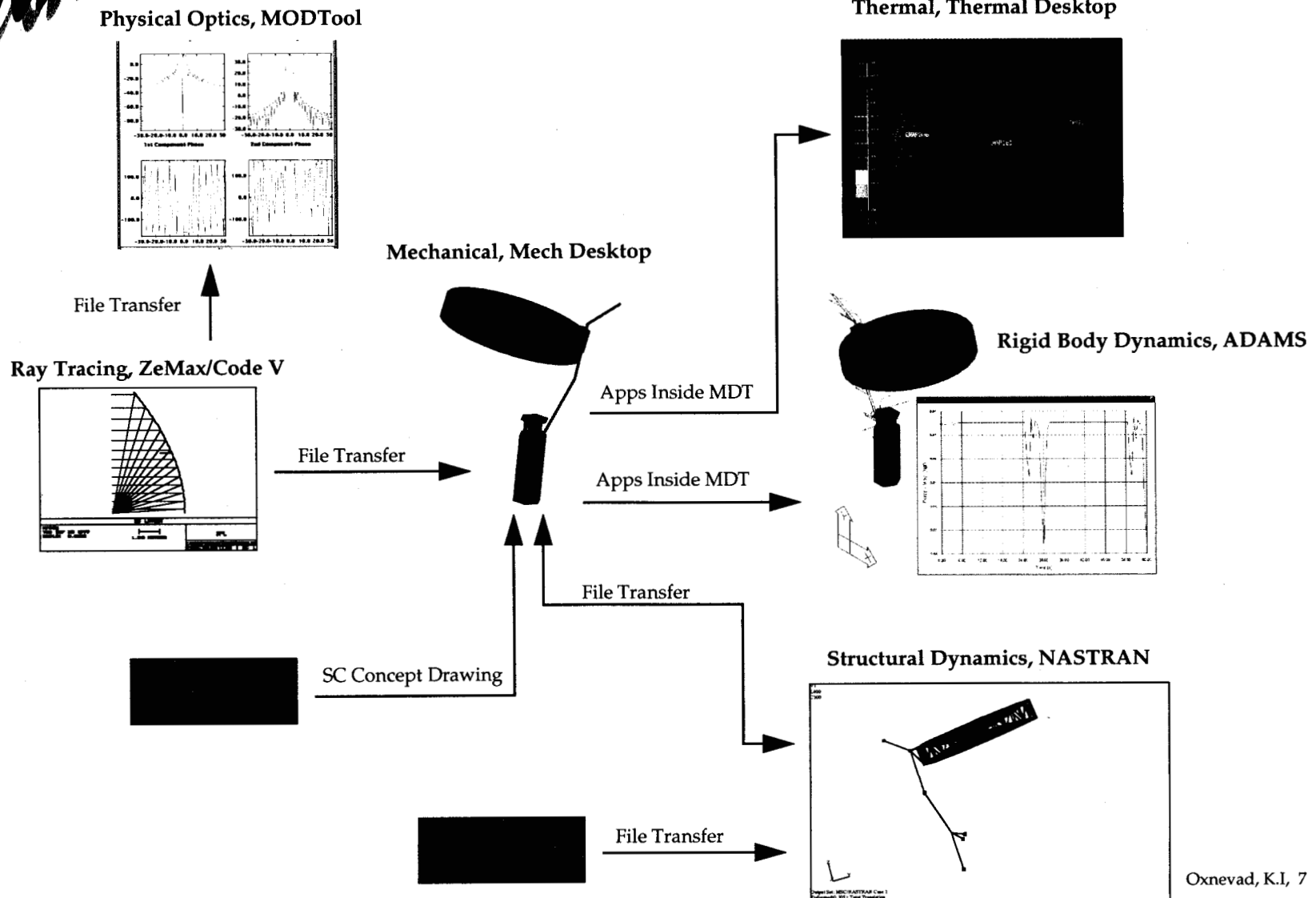
Approach
Integration of Payload and SC/ Lander
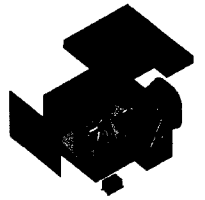
Modified 03 Lander [STEP file]   **Europa Orbiter [STEP file]**
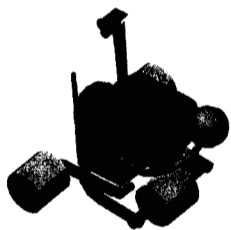
200m Drill
System
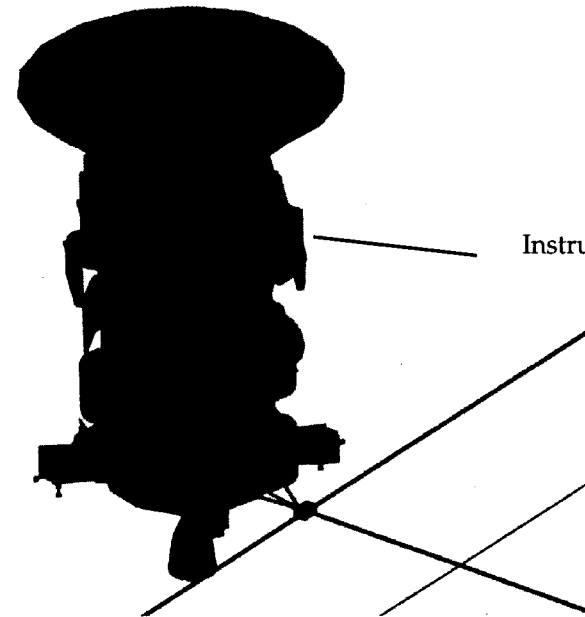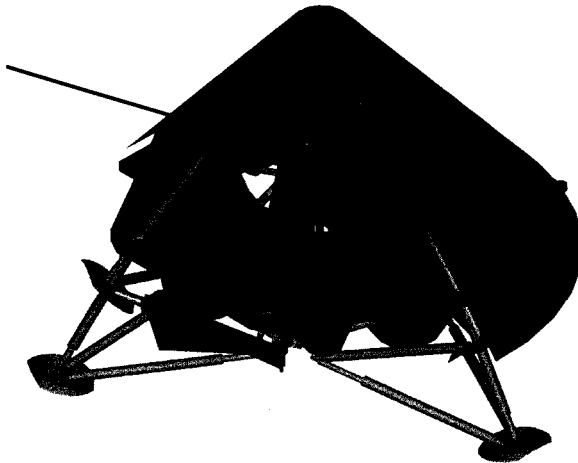
Instrument Box

Approach
Sizing and Configuration
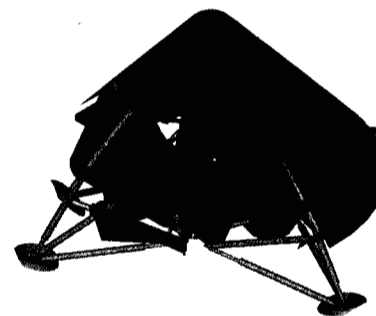
Mars Outpost
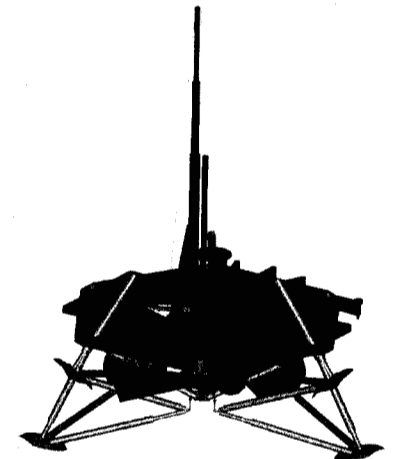*50km Fuel Cell Rover*

Mars Outpost
200m Drill

Lander Configuration

Surface Configuration

Packaged Configuration

Deployed Configuration

Oxnevad, K.I, 9

20/1/0

Team I Summary and Conclusions

- *A New and Unique Design Paradigm*

- *Cusotmers Clearly See Benefits: Development Time Reduced and Quality Increased*

- *The Team I Environment Consequently Can Be Seen As a **Laboratory for Developing Effective Conceptual Design Environments/Processes** for Demanding Types of Space Instruments , Probes, Rovers , Other Types of Surface Systems, Telecomm Systems. and SC.*

- *Team I Related Procedures and Processes are Beginning to Radically Change the Instrument/Probe Design Process at JPL.*

- *The Concurrent Design Paradigm and Design Approaches Discussed here have the Potential of Bringing Great Benefits to any Large and Complex Design and Analysis Problem*